



Consistent multiple changepoint estimation with fused Gaussian graphical models

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Abstract

We consider the consistency properties of a regularised estimator for the simultaneous identification of both changepoints and graphical dependency structure in multivariate time-series. Traditionally, estimation of Gaussian graphical models (GGM) is performed in an i.i.d setting. More recently, such models have been extended to allow for changes in the distribution, but primarily where changepoints are known a priori. In this work, we study the Group-Fused Graphical Lasso (GFGL) which penalises partial correlations with an L1 penalty while simultaneously inducing block-wise smoothness over time to detect multiple changepoints. We present a proof of consistency for the estimator, both in terms of changepoints, and the structure of the graphical models in each segment. We contrast our results, which are based on a global, i.e. graph-wide likelihood, with those previously obtained for performing dynamic graph estimation at a node-wise (or neighbourhood) level.

Keywords Changepoint · Regularisation · Graphical model · Asymptotics

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